SEASONAL CHANGES IN THE HERD STRUCTURE OF BLACKBUCK[1]

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(With a plate and a text-figure)

Five herds of blackbuck, constituting a population of over 50 animals, were observed during 1978-80 at Mudmal (16°24'N and 77°27'E) in Andhra Pradesh. The population increased to over 100 animals at the end of the study. There were five categories of social groupings most commonly met with namely: a) Mixed herds consisting of loose aggregations of males and females of various age groups; b) Herds consisting of only males — the bachelor herds; c) Herds formed solely of females; d) A single male territorial in nature accompanying several females; e) Lone territorial males.

The minimum and maximum herd size observed was 2 and 36 respectively. The mean herd size was 11.05 (SD 6.22). There were seasonal fluctuations in the mean herd size. During monsoon and winter seasons larger herds were more common compared with summer season. The size of five social groupings also registered a considerable change seasonally. The factors contributing to the changes in the herd structure are discussed.

INTRODUCTION

The present paper is based on a long term study carried out on blackbuck at Mudmal and describes the trends in the herd structure and the factors influencing it.

STUDY AREA AND METHODS

Mudmal village and its surroundings are located between 16°22'-16°26'N and 77°25'-77°27'E in Andhra Pradesh. The total study area was approximately 80 km². Over 80% of the area was cultivated and the rest of the area included patches of grasslands, rocky elevations, tanks, and phoenix groves. Other

details of the study area were described elsewhere (see Prasad & Ramana Rao 1984).

Free populations of over 50 blackbuck, distributed in five separate herds, were located in the area and were followed for a period of nearly two years. At the end of the study the total population increased to over 100 animals. All observations were made on foot with the help of 8 x 40 binoculars. Each time a herd was sighted, the number of individuals in the herd, composition of sex and age classes such as adult male, sub-adult male, adolescent male, adult female, sub-adult female and fawn were recorded. When an adult male was sighted the details such as the intensity of black colour on the coat, the shape of horns, whether territorial or otherwise were noted. Based on this data 11 males were individually identified during the course of the study. Females however, could not be identified individually.

In the case of males, the age classes were

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distinguished by the horn structure. Males with horns having less than two twists were classified as adolescents, horns with 2-3 twists and more than 3 twists were considered as sub-adults and adults respectively (see Mungall 1978). A twist is a curve to the outside (Cary 1976). In the case of females, the body size and coat colour were taken as criteria to differentiate between the age classes.

During periods of continuous observations which lasted between 1-10h, the number of animals that joined and left the herd under observation were noted. When part of the herd split up and moved far so that observations could not be made on those animals, the number of animals that remained in the area was considered for the purpose of calculating the change in the herd size. Besides, the changes in the vegetation, activity patterns of blackbuck in relation to vegetation, the disturbance by cultivators, shepherds, carts, and other vehicles and the response of blackbuck observed were noted.

RESULTS

The composition of the five herds most frequently met with during September-December 1979 is shown in table 1. Changes in the herd

structure however occurred in different seasons. The social organization of these herds was basically of five types:

a) Herds formed by males and females of all age groups which are generally known as mixed herds
b) A single territorial male with a group of females, termed pseudoharem (Mungall 1978)
c) Herds formed by males — the bachelor herds
d) Herds consisting solely of females
e) Lone territorial males

Apart from these categories, lone females were also sighted particularly either when they were pregnant or when they had recently given birth to fawns.

Over 1400 sightings of herds revealed a mean herd size of 11.05 (SD 6.22) with minimum and maximum being 2 and 36 respectively. The mean herd size varied with seasons (Tables 2 & 3). It increased from summer to winter through monsoon. There was an increase in the mean herd size from summer of 1978-79 to summer of 1979-80 which could probably due to increase in the population of the herds by the birth of fawns.

The frequency distribution of herd size classes for the three seasons is shown in the

TABLE 1

THE COMPOSITION OF FIVE HERDS MOST FREQUENTLY OBSERVED DURING
SEPTEMBER-DECEMBER 1979

Herd	Territ. Male	Adult Male	Sub-adult Male	Adolescent Male	Adult Female	Sub-adult Female	Fawn	Total
A	1	2	1	—	7	2	2	15
B	1	2	2	5	10	5	1	26
C	1	2	1	3	12	2	2	23
D	1	2	1	—	11	—	1	16
E	1	1	—	2	9	—	2	15
Total	5	9	5	10	49	9	8	95

TABLE 2

MEAN HERD SIZE DURING 1978-1979

Season	Mean herd size	S.D.	Coeff. of variation	Total
Summer	6.82	3.77	55.24	71
Monsoon	11.35	6.40	56.39	264
Winter	12.29	7.29	59.37	177

TABLE 3

MEAN HERD SIZE DURING 1979-1980

Season	Mean herd size	S.D.	Coeff. of variation	Total
Summer	10.51	6.13	58.30	232
Monsoon	11.64	6.21	53.37	466
Winter	13.66	7.04	51.53	196

TABLE 4

DISTRIBUTION OF HERD SIZE CLASSES DURING 1978-79

| | Herd size classes | | | | | |
Season	1	2-7	8-13	14-19	20-25 ≥ 26	Total
Summer	3	43	19	5	1	0	71
Monsoon	5	65	101	51	29	13	264
Winter	5	43	61	35	24	9	177
Total	13	151	181	91	54	22	512

TABLE 5

DISTRIBUTION OF HERD SIZE CLASSES DURING 1979-80

| | Herd size classes | | | | | |
Season	1	2-7	8-13	14-19	20-25 ≥ 26	Total
Summer	14	62	91	53	10	2	232
Monsoon	25	96	164	128	46	7	466
Winter	10	39	49	52	38	8	196
Totals	49	197	304	233	94	17	894

tables 4 and 5 for the years 1978-79 and 1979-80 respectively. An anova test was conducted with the null hypothesis that the frequency of herd size is independent of seasons and that there is no appreciable difference in the frequency of herd size classes in a given season. This hypothesis was rejected at 5% level of significance for the three seasons (Tables 6 and 7).

From tables 4 and 5 it is clear that the herd size classes 8-13 followed by 2-7 were more frequently seen than the rest in all seasons. There were, however, seasonal differences in the proportion of sightings of the various herd size classes. During summer season the proportion of herd size classes 2-7 and 8-13 were higher. It is also explicit that compared with monsoon and winter seasons, during summer season herd size of 14-19 and the classes below it were more frequent while during winter and more so during monsoon herd sizes larger than
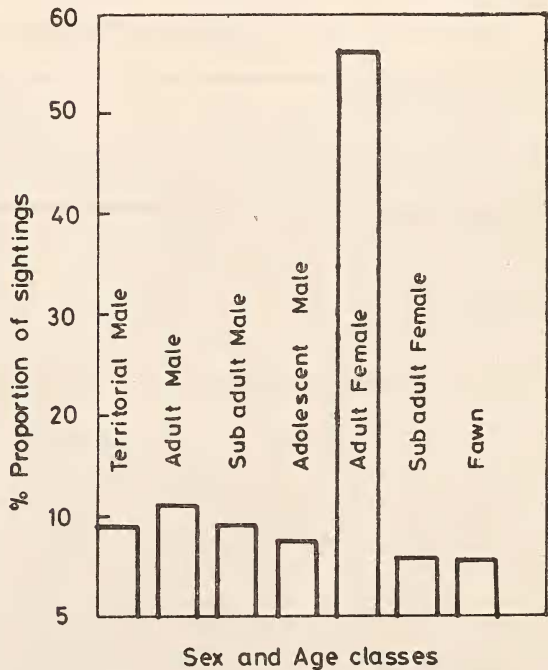

Fig. 1. % Proportion of various sex and age classes.

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TABLE 6

TWO WAY ANALYSIS OF VARIANCE OF HERD SIZE CLASSES IN THREE SEASONS DURING 1978-79

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance Ratio (F)	Tabulated F value at 5%
Between seasons	3114.11	2	1557.06	7.08	4.10
Between herd size classes	7907.11	5	1581.42	7.19	3.33
Residual	2199.22	10	219.92	—	—
Total	13220.44	17	—	—	—

TABLE 7

TWO WAY ANALYSIS OF VARIANCE OF HERD SIZE CLASSES IN THREE SEASONS DURING 1979-80.

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance Ratio (F)	Tabulated F value at 5%
Between seasons	164	2	3582.0	6.06	4.10
Between herd size classes	21278	5	4255.6	7.20	3.33
Residual	5910	10	591.0	—	—
Total	27352	17	—	—	—

TABLE 8

% PROPORTION OF SOCIAL GROUPINGS IN VARIOUS SEASONS DURING 1978-1980

Season	Mixed herds	Pseudo-harems	All female	Single males	Bachelors	Total
Summer	69.30	17.16	6.27	5.61	1.65	303
Monsoon	73.42	14.38	5.62	4.11	2.47	730
Winter	75.34	10.19	4.83	4.02	5.63	373

14 were more frequently met with as compared with summer.

The distribution of proportion of the sex and age classes of the herds is shown in fig. 1. Adult females constituted the highest with 57.24% followed by the adult males with 11.29%. The sub-adult males (9.08%) and the territorial males (8.73%) were represented next. The rest of the classes formed only 13.66%. These sightings showed an adult male to adult female ratio of 1:2.47 and one fawn to every 8.76 adult females.

The seasonal changes in the social groupings of blackbuck is shown in the table 8. The mixed herds were more frequent in all seasons and ranged between 69-75%. Pseudo-harems with 10-17% were next common social groupings. The mixed herds were compara-

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Prasad: *Antilope cervicapra*

PLATE
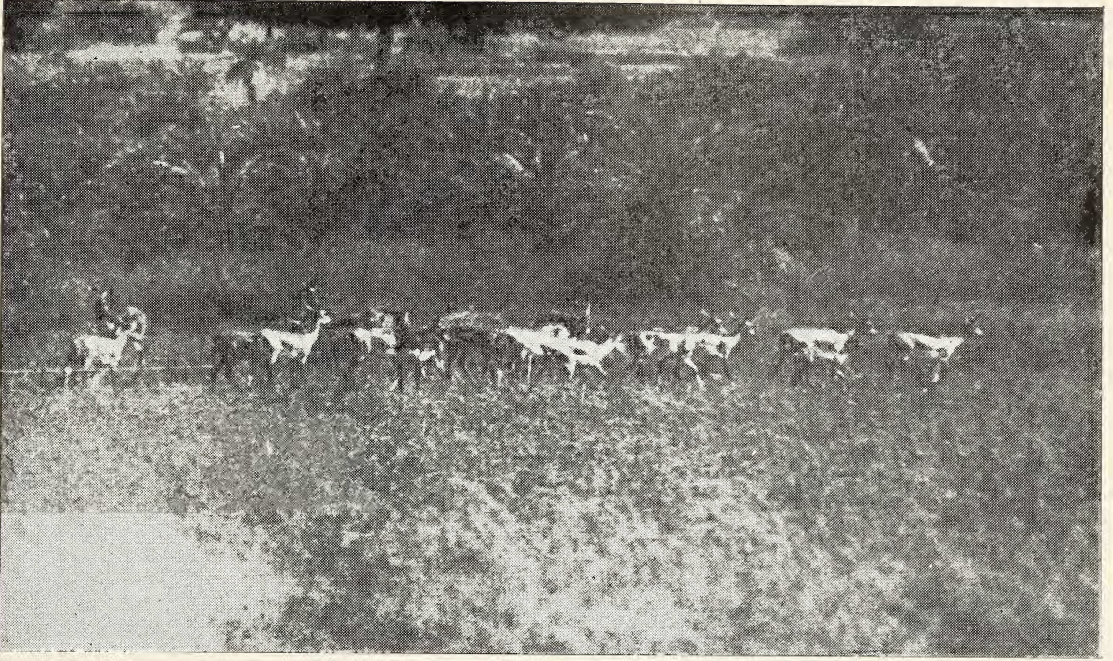
Above: Congregation of the members of herd B after a drive by cultivators.
Below: A bachelor herd.

(*Photos*: N. L. N. S. Prasad)